..OBNOV, A. V.

Chemical Abst.
Vol. 48 No. 9
May 10, 1954
General and Physical Chemistry

Adsorption properties of montmorillonite clays. B. P. Matl
Berlin, V. P. Dreving, A. V. Kiselev, V. V. Serpinskii, M.
D. Sunova, and K. D. Shcherbakova. Colloid J. (U.S.S.R.)
14, 433–41(1952)(Engl. translation).—See C.A. 47, 3080c.
H. L. H.

KISELEV, A. V.

PA 248T10

USSR/Chemistry - Adsorption   Jul 52

"The Dependence of the Heat of Wetting of Silica Gel by Water on the Degree of Filling of Its Surface," A. V. Kiselev, K. G. Krasil'nikov, N. L. Pokrovskiy, N. N. Avgul', O. M. Dzhigit and K. D. Shcherbakova, Moscow State U lmeni M. V. Lomonosov.

Zhur Fiz Khim, Vol 26, No 7, pp 986-997

This work has both theoretical and practical value. The dependence of the heat of wetting of silica gel by water, on the quantity of previously adsorbed water, was measured on a homogeneous, coarsely

248T10

porous silica gel made from $SiCl_4$, and having a known specific surface. Results of the measurements established the abs dependence of the heat of wetting by water and the differential heat of adsorption of the water vapor on amount of water adsorbed per unit of surface. The differential heat of adsorption of water vapor decreases in proportion to the increase in the degree of filling of the surface.

248T10

CHMUTOVA, K. D., AVGUL', N. N., DZHIGIT, O. M., KISELEV, A. V.

Silica

Peculiarities of adsorption of various vapors on silica gel. Zhur. fiz. khim. 26 No. 7, 1952.

Monthly List of Russian Accessions, Library of Congress, December 1952.   Unclassified.

Adsorpt. from solutions in the vicinity of the lower critical temperature. Triethylamine-water on active carbons and on lampblack. A. V. Kiselev and V. V. Kulichenko (Moscow State Univ.). Doklady Akad. Nauk S.S.S.R. 82, 89-92(1952); cf. C.A. 45, 5482g, 8847c; 46, 18d.—For a system with a lower crit. temp. of miscibility, the adsorption isotherm below the crit. temp. should pass through a max. but have an S-shape above t_c; consequently the isotherms should reverse its sign. Adsorption coeff. of the adsorption should intersect, i.e. the temp. isotherms of Me_3N in soln. in H_2O ($t_c = 18°$), at 0, 32.7, and 70°, were detd. on 3 types of adsorbents: a peat active C (I), a ZnCl₂-activated sucrose C (II), and lampblack with spherical particles (III). By adsorption of MeOH vapor, I has the finest, II coarser pores, whereas III is nonporous. At 0°, the adsorption isotherm of Me_3N passes through a max., as expected for a completely miscible system; above t_c, the curves are S-shaped. The 0° and the 32.7° isotherms intersect; at lower concns., the temp. coeff. of the adsorption is neg., whereas at higher temps.,

above the intersection point, it is pos. This corresponds to the fall of the soly. with increasing temp. at low concns., as a result of which the beginning of capillary layering and of multimol. adsorption (which mark rapid increase of the adsorption) is shifted to lower concns. If the 32.7° adsorption isotherm on II is made to coincide (through reduction of the ordinate scale by a factor of 11) with that of III at the point of relative concn. $c/c_s = 0.5$, the 2 isotherms coincide entirely up to the point of inflection; beyond that point, the reduced isotherm II passes above the isotherm I. Consequently, the primary adsorption process is the same on II and on III up to the point of beginning capillary layering or multimol. adsorption. On II, the adsorption isotherms of Me_3N from aq. soln. and from vapor end at the same finally adsorbed amt. at $c/c_s = 1$ or $p/p_s = 1$; consequently, in both instances, the same, i.e. the total, vol. of the adsorbing pores becomes filled at that point. Along the course of the adsorption, the vapor isotherm passes above the isotherm from soln., and the inflection point of the latter lies at higher c/c_s. On III, the vapor and the soln. isotherms coincide up to the point of beginning multimol. adsorption, whereafter the vapor isotherm rises rapidly above the soln. isotherm; formation of the unimol. adsorption layer is the same from vapor and from soln.

N. Thon

USSR.

The absolute isotherms for the adsorption of nitrogen vapor on silica gel, alumino-silica gel, and barium sulfate. V. P. Dreving, A. V. Kiselev, and O. A. Likhacheva (M. V. Lomonosov St., Moscow). Doklady Akad. Nauk S.S.S.R. 82, 377-80(1952); cf. C.A. 46, 316i; 47, 4104f.— The abs. adsorption isotherms for N on SiO_2 gel, alumino-silica gel, and $BaSO_4$ were compared for a temp. of $-105.7°$. The unimol. adsorption isotherms on SiO_2 gel and alumino-silica gel almost coincide. The curve for adsorption on $BaSO_4$ has a steeper slope at the beginning. In the region of multimol. adsorption all 3 isotherms coincide. The isotherms that are obtained are useful in detg. the specific surface of the adsorbent.   J. Roytar Leach

KISELEV, A. V.

PA 234T13

USSR/Chemistry - Adsorption

1 Apr 52

"Hysteresis in Forcing Mercury Into Porous Materials,"
N. M. Kamakin, A. V. Kiselev, Groznenskiy Petroleum
Sci Res Inst

"Dok Ak Nauk SSSR" Vol 83, No 4, pp 589-592

Hysteresis curves were prepd for 2 samples of alumina
silica gel using mercury under pressure. The results
show that this method of studying the structure of
porous materials gives results that agree with those
obtained by the method of capillary condensation of
vapors.

234T13

KISELEV, A. V.

1 Sep 52

USSR/Chemistry - Adsorption

Adsorption of Vapors on Nonporous Activated Carbon, Particularly Carbon Black," N. N. Avgul', O. M. Dzhigit, A. V. Kiselev, Moscow State U imeni M. V. Lomonosov and Inst of Phys Chem, Acad Sci USSR

"Dok Ak Nauk SSSR" Vol 86, No 1, pp 95-98

Adsorption isotherms of water, methyl alc, and benzene on carbon black are constructed for 0 to 1 p/p_s. Each isotherm is characteristically different from the others. The specific characteristics and differences are described. The purpose of the investigation was to investigate the adsorptive properties of the carbon surface itself and to eliminate the effect of pores, which is prominent in ordinary gas-mask carbon. Presented by Acad M. M. Dubinin 27 Jun 52.

PA 234T17

KISELEV, A. V.

235T31

UBSR/Chemistry - Adsorption   11 Sep 52

"The Relationship Between the Adsorption of Iso-
pentane Vapor and the Pore Size of Silica Gels,"
V. P. Dreving, A. V. Kiselev, Yu. A. El'tekov,
Moscow State U imeni M. V. Lomonosov

"Dok Ak Nauk SSSR" Vol 86, No 2, pp 349-352

Adsorption isotherms of isopentane on the follow-
ing silica gels were constructed: Ye, VKhK,
TS-200, and S-200. A quant relationship was established
between the work of adsorption and the size of the
pores. Presented by Acad M. M. Dubinin 27 Jun 52.

235T31

Kiselev, A. V.

Capillary condensation of vapors and pore structure of active carbons. N. N. Avgul, O. M. Dzhigit, and A. V. Kiselev (M. V. Lomonosov State Univ., Moscow). *Doklady Akad. Nauk S.S.S.R.* 89, 97-9(1953).—In order to clarify the problem of capillary condensation, the adsorption of vapors was studied on active carbons with coarse pore structure as well as on nonporous active C (carbon black). The adsorption of H_2O, $EtOH$, C_4H_9OH, C_6H_6, and C_6H_{14} was studied. All of the isotherms are characterized by hysteresis due to capillary condensation. The adsorption of H_2O on nonporous C indicates that the vapor is adsorbed as a unimol. layer in which the mols. are bound by H bonds.   J. Rovtar Leach

KISELEV, A. Y.

V. Determination of the adsorption isotherm and the differential heat of adsorption of water on carbon black. N. N. Avgul, O. M. Dzhigit, A. V. Kiselev, and K. D. Shcherbakova (M. V. Lomonosov State Univ., Moscow). *Doklady Akad. Nauk S.S.S.R.* 92, 105-8(1953); cf. *C.A.* 49, 15359*h*.—Carbon black (C 97.9, H 0.7%, O 1.4%) was evacuated to a pressure of 5×10^{-5} mm. at 280°, and the adsorption and desorption isotherms and heats of adsorption were detd. at 19°. The adsorption and desorption isotherms did not coincide and were characterized by two points of inflection at $p/p_* \cong 0.5$, $a \cong 1.1$ millimol./g. and $p/p_* = 0.84$, $a = 1.97$ millimol./g., resp. (p/p_* is the relative pressure, a is the quantity adsorbed per g. of C black). Values of adsorption were also calcd. in terms of $a = a/s$, where $s = 125$ sq. mm./g. The noncoincidence of adsorption and desorption isotherms was attributed to a slow process of swelling. Calorimetric detn. of the differential heat of adsorption Q_a (cf. Kiselev, *et al.*, *C.A.* 43, 6871*d*) gave values of $Q_a = 10.75$ kcal./mol. ($a < 1.97$ millimol./g.) and $Q_a = 10.55$ kcal./mol. ($a > 1.97$ millimol./g.). The latter value is identical with the heat of condensation $L = 10.6$ kcal./mole. The quantity $a = 1.97$ millimol./g. corresponds to a mean area of 10.5 sq. A. for a H$_2$O mol. in a unimol. layer (the calcd. value is 10.6 sq. A.). The adsorption capacity of C-black samples decreased with increasing ignition temp. during evacuation prior to adsorption expts. The surface interaction of H$_2$O with C black appears to be due to H-bond formation with oxides or hydroxides contained in the surfaces investigated. I. P.

U S S R.

The adsorption of nitrogen vapors on carbon black. A. P. Karnaukhov, A. V. Kiselev, and E. V. Shirageva (M. V. Lomonosov State Univ., Moscow). Doklady Akad. Nauk S.S.R. 92, 881-4(1953); cf. Avgul', et al., C.A. 47, 11583.—The adsorption of N on C black was studied over a broad range of degrees of surface filling. The measurements were made with the samples used in the earlier work on the b.p. of N. The satn. point corresponded to 1.07 cc./g. The pore diam. was calcd. to be 620 A., and the sp. surface was 125 sq. m./g. These values agree well with those obtained by expts. on the adsorption of C_6H_6. J. R. L.

Kiselev, A.V.

Isotherms and the heat of adsorption of methyl alcohol on charcoal. N. N. Avgul, O. M. Dzhigit, A. V. Kiselev, and K. D. Shcherbakova (M. V. Lomonosov State Univ., Moscow). *Doklady Akad. Nauk S.S.S.R.* 92, 1185-8 (1953).—The adsorption isotherms and the heat of adsorption were detd. for McOH vapors on charcoal (Spheron-6). The adsorption isotherm is characterized by its wave-shape with four points of deflection. The change in the heat of adsorption, Q_A, with the degree of filling of the surface, α, was studied. In the region $\alpha \leq 0.4$ micromoles/sq. m., Q_A decreases sharply from 16.2 to 13.3 kcal./mole. For $\alpha = 0.4-2.7$ micromoles/sq. m., Q_A remains const. Then it decreases almost linearly until $\alpha = 17.6$ micromoles/sq. m., where it drops off suddenly to 9.3 kcal./mole. The adsorption of McOH on Spheron-6 is compared with that for graphite and Graphon.   J. Rovtar Leach

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KISELEV, A.V,

USSR

Triethylamine adsorption from vapors and from solutions on silica gels of different structures. A. V. Kiselev and V. V. Kulichenko (M. V. Lomonosov State Univ., Moscow). *Doklady Akad. Nauk, S.S.S.R.* 93, 101–4(1953).—The adsorption-desorption isotherms of Et_3N were studied on a uniform large-pore and a uniform fine-pore gel from the vapor phase and from heptane and H_2O soln. A reproducible hysteresis was obtained with the coarse gel only. Unlike the adsorption of hydrocarbons, the isotherm is irreversible in the low-pressure range, i.e. with a unimol. layer formation. After the formation of a continuous unimol. layer, the Et_3N layer effectively screens the SiO_2 surface with the amine N oriented towards the gel OH because of the basic character of the amine. Et groups screen the gel more effectively than do Me groups (in MeOH adsorption). The mechanism of the amine adsorption from heptane and water soln. is explained similarly.   W. M. Sternberg

Kiselov, A. V.

USSR/Chemistry - Physical chemistry

Card 1/1   Pub. 147 - 14/25

Authors   : Dzhigit, O. M.; Kiselev, A. V.; Neymark, I. E.

Title   : Standard series of silica gels and their structure

Abstract   : Various standard silica gel samples were investigated to determine the effect of pore narrowing on the absolute adsorption properties of SiO_2. nH_2O type adsorbents (from nonporous quartz to the finest porous silica gels). It was found that the change in the form of absolute isotherms, which takes place during reduction of pore dimensions and increase in molar volume of the adsorbed substance, is due to the intensification of the adsorption bond which is usually attributed to the dispersion forces having additive characteristics. The connection between the pore structure and the skeletal structure of silica gels was investigated and the results obtained are described. Forty-one references: 36-USSR; 2-USA; 2-German and 1-French (1932-1954). Table; graphs.

Institution : Acad. of Sc. Ukr-SSR, The L. V. Pisarzhevskiy Institute of Physical Chemistry and the M. V. Lomonosov State University, Moscow

Submitted : February 28, 1954

Kiselev, A.V.

The effect of dehydration of a silica-gel surface on its adsorption properties. A. V. Kiselev, K. G. Krasil'nikov, and L. N. Soboleva (Lomonosov State Univ., Moscow). *Doklady Akad. Nauk S.S.S.R.* **94,** 85-8 (1954).—The effect of the chem. structure and the state of an adsorbent surface on the abs. values of the adsorption and the energy of adsorption was detd. on partially dehydrated SiO₂ gel. The adsorbates were McOH and C₆H₆ vapors and phenol in a heptane soln. The removal of OH groups from the SiO₂-gel surface by dehydration lowers the adsorption of all of the adsorbates but it is particularly significant for those that can form H bonds with the OH groups of the adsorbent surface (McOH, C₆H₅OH).

J. Rovtar Leach

KARNAUKHOV, A.P.; KISELEV, A.V.; KHRAPOVA, Ye.V.

Nature of the adsorption of nitrogen vapors on quartz and
silica gels. Dokl.AN SSSR 94 no.5:915-918 F '54.   (MLRA 7:2)

1. Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova.
Predstavleno akademikom M.M.Dubininym.
                    (Adsorption) (Nitrogen) (Silica)

Kiselev, A. V.

USSR/ Chemistry - Physical chemistry

Card 1/1   Pub. 22 - 28/48

Authors   : Kiselev, A. V.

Title   : About the structure of certain xerogels, pores and particles

Periodical : Dok. AN SSR 98/3, 431-434, Sep 21, 1954

Abstract   : A comparison of numerous literature data regarding the structure, pores and particles of certain xerogels, is presented. A study of the formation of silica-xerogels proved that the pores originate basically during desiccation when liquid menisci appear between the approaching hydrogel particles. The effect of such menisci and the effect of blocking the surface hydroxyl groups with ions on the approach and growth of gel particles, are discussed. Data pertaining to the homo- and heterogeneity of primary gel particles, their formation and deformation, are included. Nineteen references: 14-USSR; 2-English; 2-USA and 1-French (1947-1954). Table; graphs; drawings.

Institution: The M. V. Lomonosov State University, Moscow

Presented by : Academician M. M. Dubinin, May 5, 1954

KISELEV, A.V.

Effect of the size of pores and of the chemical properties of
silica-gel surfaces on their adsorptive properties. Trudy Kom.
anal.khim. 6:46-76 '55.   (MLRA 9:5)

1. Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova i
Institut fizicheskoy khimii AN SSSR.
                    (Silica) (Adsorption)

AF701597   TREASURE ISLAND BOOK REVIEW   AID 802 - S

KISELEV, A. V. (Institute of Physical Chemistry, Academy of Sciences, USSR).

DISKUSSIYA (Discussion). In Problemy kinetiki i kataliza (Problems of Kinetics and Catalysis), vol. 8. Izdatel'stvo Akademii Nauk SSSR, 1955. Section I: Effect of illumination on the adsorbability of solids. p. 71-72.

The work by W. A. Weyl on dehydration of silica gel is discussed, as well as the paper by A. N. Terenin on the formation of adsorption-active structures of silical gels.

Dehydration occuring at low temperatures causes the formation of highly reactive free radicals on the surface of silica gels, while dehydration at high temperatures results in the formation of a surface which does not absorb water vapor. Five references, 4 Russian (1936-1954).

1/1

Capillary condensation of various vapors on a coarse porous silica gel. N. N. Avgul, G. M. Dshigit, and A. V. Kiselev (M. V. Lomonosov State Univ., Moscow). Zhur. Fiz. Khim. 29, 318-26(1955); cf. C.A. 49, 3611b.—In a SiO_2 gel the total vol. of pores was found from d to be 1.09 cc./g. and the most frequent pore diam. d was 29.5 A. (from electron micrographs). The max. vol. adsorbed var-ied between 1.04 cc./g. for EtN vapor at 20° and 1.76 cc./g. for N_2 at −191°, i.e., it was almost equal to v. The s area s' of the liquid film in the pores was calcd. from equa-tion $\sigma s' = \int A da$, if σ was surface tension, A the differential work of adsorption, and a the amt. adsorbed, the integra-tion being performed in the hysteresis range. The s' varied between 275 sq. m./g. for H_2O and 215 for isopentane (both at 20°, in agreement with the 315 sq. m./g. of the solid adsorbent calcd. from the adsorption of N_2 at low gas pressures. The frequency of distribution of pore diams. was calcd. from the adsorption isotherms by Kelvin's equation. The most frequent diam. d corrected for the thickness of the adsorbed layer, varied between 176 A. for benzene and 258 A. for MeOH, in accord with the above d. The ratio $4v/s'$ should be nearly identical with d; it was 215 A. Thus gel dimensions determined by the means of capillary condensation agree well with those of inde-pendent methods. The above method of calcn. is applied also to the gel of Hartell and Bower (C.A. 40, 6896). The calcn. used by Fu and Hartell (C.A. 45, 6896) was not new (cf. Kiselev, C.A. 40, 3036) and less exact than the above method.   J. J. Bikerman

KISELEV, A.V.

USSR/Chemistry - Physical chemistry

Card 1/1   Pub. 22 - 28/50

Authors   :   Kiselev, A. V., and El'tekov, Yu. A.

Title   :   Adsorption of benzene from solutions in heptane over silica gel of
                  different structure

Periodical   :   Dok. AN SSSR 100/1, 107-110, Jan. 1, 1955

Abstract   :   The study of benzene adsorption from solutions showed that the narrowing
                  of pores of silica gels of the third structural type (uniformly finely
                  porous) sharply increases the upward curvature of absolute adsorption isoth-
                  erms of such hydrocarbons as heptane and isopentane. The adsorption
                  potential of silican gels increases during the reduction of pore diameters
                  to less than $50 A^{o}$ The results obtained by studying the absolute adsorption
                  isotherms of benzene from vapors and liquid solution in heptane over two
                  porous silica gels that are identical in structure are listed. Thirteen
                  USSR references (1947-1954). Graphs.

Institution: The M. V. Lomonosov State University, Moscow

Presented by: Academician M. M. Dubinin, May 5, 1954

KISELEU , A . V .

USSR/ Chemistry - Physical chemistry

Card 1/2   Pub. 22 - 24/51

Authors   : Avgul', N. N.; Dzhigit, O. M.; Kiselev, A. V.; and Shcherbakova, K. D.

Title   : The isotherm and the heat of adsorption of water vapors over carbon

Periodical : Dok. AN SSSR 101/2, 285-288, Mar 11, 1955

Abstract   : The isotherm and the heat of water vapor adsorption were investigated for
             a finely porous sugar carbon activated in a CO_2 stream at 1000°. Results
             indicate that the monomolecular water adsorption on the oxidized surface
             is followed by capillary condensation in the pores.

Institution : Acad. of Sc. USSR, Inst. of Phys. Chem. and the M. V. Lomonosov State Univ.
              Moscow.

Presented by: Academician M. M. Dubinin, October 5, 1954

Periodical : Dok. AN SSSR 101/2, 285-288, Mar 11, 1955

Card 2/2   Pub. 22 - 24/51

Abstract   : The pore structure of the carbon was found to have a specific effect on the water vapor adsorption. The monomolecular adsorption and the capillary water vapor condensation apparently superimpose on each other because of the small pore dimension of this carbon. Thirteen references: 7 USSR and 6 USA (1927-1954). Graphs.

KISELEY, A.V.

Research on adsorption of ...
State University ...
...
...
sorption, and related problems.   22 references.
C. H. Buchanan

KISELEV, A.V.

NO 11

↳ Heat of adsorption of benzene vapors and various thermodynamics and adsorption forces. N. N. Avgul, A. V. Kiselev, and I. A. Lygin, *Izv. Akad. Nauk S.S.S.R., Otdel. Khim. Nauk* 1956, 1304-11. --C.A. 51, 6300f.--The heats of adsorption and the adsorption isotherms were detd. for C_6H_6 adsorbed on samples described previously (loc. cit.). The change in free energy, total energy, and entropy of adsorption with change in the degree of covering of the surface were detd. For C_6H_6 covering half the surface the following values were detd.: $\Delta U^\circ = -1.85$, $\Delta F^\circ = -2.40$ kcal./mole and $\Delta S^\circ = +1.9$ cal./mole degree. A theoretical calcn. for energy of adsorption agrees closely with the measured values.

J. Rovner Leach

KISELEV, A V

/14073* (Russian.) Hydrocarbon Adsorption Properties Ad-
sorbtsionnye svoistva uglevodorodov. A. V. Kiselev, L Lockhi
Khimn, v. 25, no. 6, June 1956, p 565-74.
Absolute values of adsorption and heat of adsorption; nature
of their structure (bune-silica gels. Nature of adsorption of
active silica gels . . . adsorption of hydrocarbon vapors . .
. . . silica gels . . . . . . adsorption of hydro-
carbons. Measurement and . . . .

KISELEV, A. V.

USSR/Physical Chemistry - Surface Phenomena. Adsorption. Chromatography. Ion Exchange, B-13

Abst Journal: Referat Zhur - Khimiya, No 19, 1956, 61211

Author: Kiselev, A. V., Shikalova, I. V.

Institution: None

Title: Adsorption of Fatty Alcohols and Phenols from Aqueous Solutions on Carbon Black

Original Periodical: Zh. fiz. khimii, 1956, 30, No 1, 94-108

Abstract: With the view of resolving the question of the orientation of the molecules of the adsorbate at the surface of carbon adsorbents, were recorded at 20° the adsorption isotherms (A) of n-propanol (I), n-butanol (II), n-hexanol (III), phenol (IV), resorcinol (V), hydroquinone (VI), and phloroglucinol (VII) from aqueous solutions at channel black having a specific surface of 150 m^2/g. Absolute isotherms plotted in accordance with the thus secured and the literature data show that A of fatty alcohols and phenols at carbon black

Card 1/2

Kiselev A.V.

Enhancement of the adsorption of organic substances from aqueous solutions by a decrease in the pore size of active

III were almost identical at $c/c_0 < 0.1$ whereas at

IV

KISELEV, A. V.
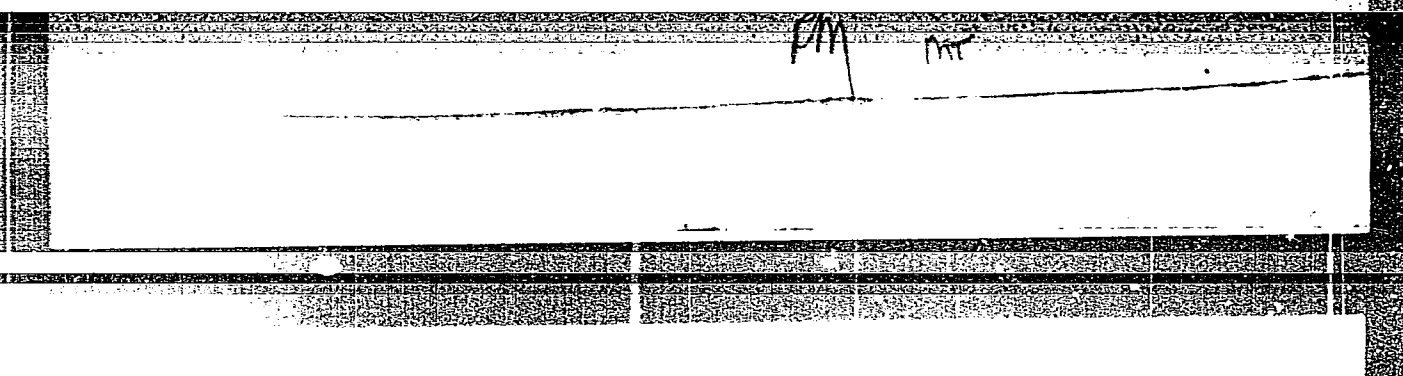
Structure changes in the aluminum silicate catalyst studied by adsorption and electron-microscope investigations. A. V. Kiselev, K. A. Leontev, Yu. S. Nikitin. M. V. Lomonosov State Univ., Moscow. 30, 4115-89 (1955).—Structural changes were investigated in 3 spherical Al silicate catalysts, made by calcining the catalysts at 600° for 6 hrs., and by steam heat for 24 hrs., by studying the adsorption of MeOH and C_6H_6, and by electron micrographs at 11,000-29,000 magnifications. The porosity was tested by the B.E.T. method. Reduces the sp. surface and the porosity without affecting appreciably the pore size. Reduces the sp. surface and enlarges the primary components of the catalyst. The larger, smoother and more uniform. And lowers the energy.

dehydration during the steam-treatment.

KISELEV, A.V.; KOVALEVA, N.V.

Adsorption of water vapor by activated carbon. Zhur. fiz. khim. 30
no.12:2775-2786 D'56.   (MLRA 10:4)

1. Akademiya nauk SSSR, Institut fizicheskoy khimii, Moskva.
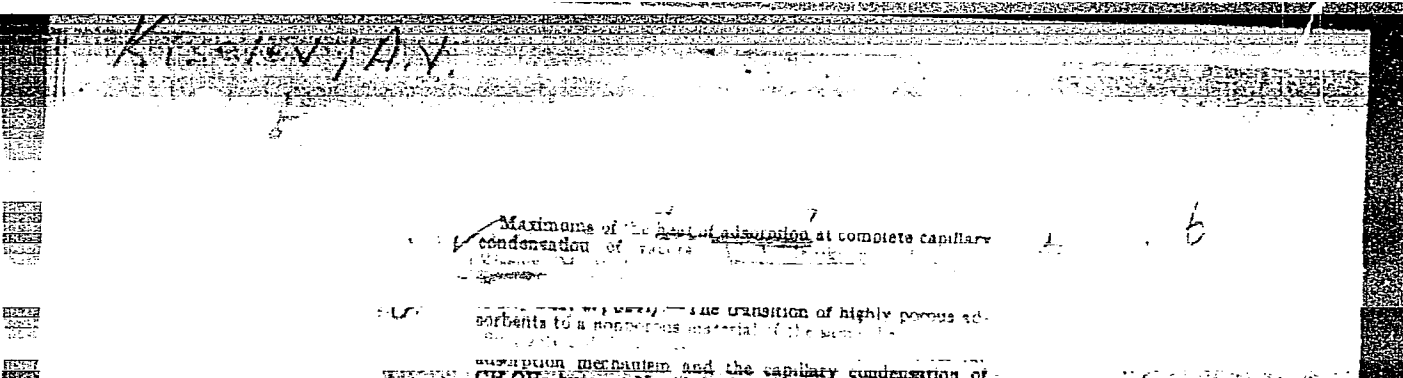   (Adsorption)   (Vapors)   (Carbon, Activated)

Kiselev, A.V.

Adsorption of a toluene-heptane
graphitized carbon

KISELEV — A.V.

Acidic-basic mechanism of the adsorption on silica gel. A. V. Kiselev (M. V. Lomonosov State Univ., Moscow). Doklady Akad. Nauk S.S.S.R. 106, 1043-9(1956).—In contrast with the phys. theories of adsorption (by regular orientation effects, or induction forces, or dispersion), K. emphasizes the chem. interaction and selectivity of adsorption processes bringing about mole complexes of variable stability, as a function of specific conditions of the interaction of the adsorbed mols. on the adsorbent. Adsorption is thus understood as a limiting case of solv. The electron acceptor and donor relations are in parallel with acid-base interactions, particularly if H-bonding takes place, e.g. in the π-complexes between HCl and aromatic hydrocarbons (cf. Brown and Brady; C.A. 47, 304d), indicated by infrared spectroscopy. Also the adsorption of amines on microporous glass, or that of Et₃N on SiO₂ gel (C.A. 49, 6087a; 12081a), or of MeOH and PhOH has these characteristics. In all these cases the adsorption is a step forward to true reactions, forming finally SiO₂ ethers. This is indicated by the lowering of the H₂O or MeOH vapor pressure over SiO₂ gel. The specific activity of SiO₂ gel is explained by the interaction of the OH groups with π electrons in the aromatic core, similar to the benzene-HCl interaction, and π-complexes are formed. With PhOH the same interaction is supplemented by that of the OH groups of the gel with the O atom in the PhOH hydroxyl. The selectivity of such chem. adsorption effects is practically important for the removal of olefins and aromatic substance from mixts. with satd. hydrocarbons (cf. C.A. 49, 14420d), or of naphthalene from pentane solns., α-methyl naphthalene from toluene, etc. Similar conditions are discussed for active charcoal and graphites, and for the chromatographic reactions in which SiO₂ and Al₂O₃-SiO₂ gels are the adsorbents.

— W. Eitel

Maximums of the heat of adsorption at complete capillary condensation of vapors

the transition of highly porous adsorbents to a nonporous material of the same

adsorption mechanism and the capillary condensation of

ABSORPTION OF METHANE ON CARBON BLACK AND (ACTIVE) CARBON ABOVE AND
Kiselev, A.V. et al.

KISELEV   A.V. professor, redaktor; DZHIGIT, O.M.,redaktor; MEZ'YER, V.V.,
tekhnicheskiy redaktor

[Surface chemical compounds and their role in adsorption; a collection
of papers didicated to the 200th anniversary of the Moscow State
University, 1755-1955] Poverkhnostnye khimicheskie soedineniia i ikh
rol' v iavleniiakh adsorbtsii; sbornik trudov konferentsii po
adsorbtsii, posviashchennoi 200-letiiu Moskovskogo gosudarstvennogo
universiteta imeni M.V. Lomonosova, 1755-1955. Moskva, Izd-vo
Mosk. univ., 1957. 367 p.   (MLRA 10:5)
            (Surface chemistry) (Adsorption)

KISELEV, A. V.

"Capillary Condensation Heat Maxima," Moscow, 1957

Moscow State U. im. Lomonosov and Inst,Phys. Chem., AS USSR

This paper reports investigations of the differential heats of adsorption up to saturation on adsorbents of various nature and structure.

A-3,079,288

KISELEV, A. V.

Effect of chemical nature of graphite objects on the adsorption of substances having different structures. A. Kiselev (M. V. Lomonosov State Univ., Moscow. Izhest. Khim. Soedinen. ... Sbornik Trudov Konferents. Adsorbtsii 1957. ... review of the merits and applications of chem., magnetic, electrochem., thermoemission, photoemission, ionic, and isotopic methods for studying surface phenomena. 91

KISELEV A. V.

Chemical structure of silica gel and its adsorption properties. A. V. Kiselev (M. _____ _____ _____ __ ____ _____ K____ ___ ___ Addendum, Sbornik Trudov A_____ 00-128; cf. C.A. 50, 7540i.—Review with 84 references.
A. P. Kotloby

Kiselev, A. V.

AVGUL', M.N., KISELEV, A.V.

Energy of adsorption forces and heat of adsorption of simple
molecules on graphite. Izv.AN SSSR. Otd.khim.nauk no.2:230-
231 F '57.   (MIRA 10:4)

1. Institut fizicheskoy khimii Akademii nauk SSSR.
        (Adsorption)

KISELEV, A. V.

Distr: 4E4j/4E2c(j)

No 4

Energy of adsorption bond and heat of adsorption of n-alkanes on carbon black. N. N. Avgul, G. I. Berezin, A. V. Kiselev, and I. A. Lygina. Izvest. Akad. Nauk S.S.S.R., Otdel. Khim. Nauk 1957, 1021-31(1957).—In a calorimeter of const. heat exchange, abs. isotherms of adsorption and differential heat of adsorption of pentane, heptane, and octane vapors on C black were detd. and compared with those obtained previously. The thermodynamic characteristics of adsorption and wetting were also detd. The standard values of total and free energy and entropy and entropy of adsorption are linear functions of the no. (n) of C atoms in the mol. The heat of wetting is independent of n. An approx. equation for the isotherm const. of adsorption of these n-alkanes is given. Theoretically calcd. dependence of the energy of adsorption of n-alkanes on carbon black on n, a $\Phi = 0.9 + 1.85n$ kcal./mole, gives results that agree satisfactorily with those obtained experimentally.
A. Libackyi

Kiselev A. V.

AUTHOR: Kiselev, A. V., Doctor of chemical sciences.   30-10-5/26

TITLE: Some Problems Concerning the Theory of Adsorption
            (Nekotoryye voprosy teorii adsorbtsii)

PERIODICAL: Vestnik AN SSSR, 1957, October, Nr 10, pp. 43-53 (USSR)

ABSTRACT: The equilibrium of adsorption can be considered as
            equilibrium of the adsorbent with the spatial phase of the
            adsorption complexes on the surface, in which case it is
            irrelevant from the thermodynamic point of view, whether
            the adsorption takes place physically or chemically.
            The adsorption of monomolecular layers with a horizontal
            interaction can be described by the equation of equilibrium:

$$\alpha = \frac{\alpha_m K_1 \, h \, (1 - \alpha/\alpha_m)}{1 - K_n K_1 h (1 - \alpha/\alpha_m)}$$

            This equation passes over into Lengmyur's equation in that
            case where no interaction takes place between the molecules
            of the adsorbent.
            The theoretical computation of the constants of the
            equilibrium of adsorption requires first the computation of

Card 1/3

Some Problems Concerning the Theory of Adsorption   30-10-5/26

the energy of the adsorbing forces and of the entropy of adsorption.

Computations were made for the cases a) adsorbing energy of normal alcanes and b) adsorbing energy of some isomeric alcanes, cyclones and aromatic hydrocarbones. The results of these computations were partly diagrammatically represented. It may be stated that the theoretically computated values agree very well with the experimentally found values.

In the case of the computation of the entropy of adsorption it is shown that a satisfactory consistency of the theoretically calculated and the experimentally found values can also be determined.

The influence of chemical modification on the surface of the adsorbent plays an essential rôle in the chemistry of crystals. Concluding it may be stated that today it is already possible to predetermine the influences of the aforesaid effects on various important systems and also the evaluate them mathematically.

Card 2/3

Some Problems Concerning the Theory of Adsorption   30-10-5/26

> There are 7 figures, 2 tables, and 27 references,
> 22 of which are Slavic.

AVAILABLE: Library of Congress

Card 3/3

KISELEV, A. V.

AUTHORS: Avgul', N. N., Isirikyan, A. A.,   62-11-4/29
            Kiselev, A. V., Lygina, I. A., Poshkus, D. P.

TITLE: Adsorption Equlibria and the Energy of Adsorption
            Powers (Adsorbtsionnyye ravnovesiya i energiya
            adsorbtsionnykh sil).

PERIODICAL: Izvestiya AN SSSR, Otdel. Khim. Nauk, 1957, Nr 11,
            pp. 1314-1327 (USSR)

ABSTRACT: Here the theoretical and experimental investigation of the
            adsorption powers in physical adsorption, mainly of complicated
            non-polar molecules with adsorbents of an atomic and ionic
            lattice, is brought. The results of the theoretical
            computation are compared with the measurings of the dif-
            ferential heats of the adsorption. Here a method for the
            computation of the adsorption energy of non-polar molecules
            with regard to three terms in the potential of the dispersion
            powers with constants, which are computed by means of
            polarizibility and magnetization-coefficients, was worked
            out. With it the induction potential by the average
            polarizibility of the adsorbed substance and the average
            electrostatic field of the adsorbent was taken into
            consideration. Furthermore the push-off potential with a

Card 1/3

Adsorption Equilibria and the Energy of Adsorption Powers   62-11-4/29

constant in the exponent, which is computed from the
individual constants of the ;   adsorbent, is taken
into consideration. Finally all interactions of the given
power center of the molecule of the adsorbed substance are
added up with all adsorbent-lattice centers. The push-
off constant before the exponential function is determined
from the condition of the minimum of total energy of all
interactions in an equilibrium distance from the adsorbent-
surface. It is shown that the computed adsorption energy
amounts of inert gases, nitrogen and 13 hydrocarbons of
different structure (normal and isomeric alcanes, alcene,
aromatical ones) on graphite are similar to the measured
adsorption heats on graphited soot. It is shown that the
computed adsorption energy amounts of the n-alcanes, of the
benzene and toluene on magnesium oxide are also similar to
the measured adsorption-heats. Furthermore it is shown, that
in the case of an adsorption on graphite the amounts of the
first, second and third term of the energy of dispersion
powers and the absolute amount of the push-off energy were
90-95, or 5-10, or 0.5 - 1, or 35 - 40 % respectively of
the total energy of dispersion powers in the investigated

Card 2/3

Card 3/3

KISELEV, A.V.; MUTTIK, G.G.

Adsorption of water vapor by silica and hydration of the surface
of latter [with summary in English]. Koll.zhur. 19 no.5:562-571
S-O '57.   (MIRA 10:10)

1.Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova,
Laboratoriya adsorbtsii.
                    (Adsorption) (Hydration) (Silica)

The effect of the pore dimensions and the hydration of the surface of silicas on the adsorption of nitrogen vapor. Kiselev and R. V. Khrapova

KISELEV, A.V.

KISELEV A. V.

... ... in the rever ... ...
... ...
... ... observed with the ... ...
range of relative pressures, similar to the ... ...
tion in uniformly coarse-pore gels. The heat of adsorption
with char was greater than in the nonporous sample, causing
... increase in the energetic interaction of ... ...
... the C in the finest ... ...

Kiselev, A.V.

Distr: HEl.J

27

Adsorption of water vapors on a hydrated silica gel surface of different structure. L. D. Belyakova, T. M. Dzhigit, and A. V. Kiselev (M. V. Lomonosov State Univ., Moscow). Zhur. Fiz. Khim. 31, 1877-84(1957). cf. following abstr. The abs. reversible isotherms of H_2O adsorption are a function between the no. of mols. in a single layer of gel to the max. content of the HO^- groups on the gel surface, and, finally, the effects of pore-size reduction on the water-vapor adsorption by SiO_2 gels of known surface were detd. The standard SiO_2 samples (Dzhigit, et al., C.A. 49, 3619e) of a graded series of gels with a total pore vol. of 0.25-0.90 cc./g. and 4 industrial samples, pore vol. 0.35-0.93 cc./g. were purified as before but dried at 200°, and the pore diam. varied between 104 and 24 A. The 1st adsorption isotherm obtained was not reversible, owing to the surface hydration, but the succeeding adsorption-desorption cycles were reversible. The adsorption isotherms of the coarse- and fine-grain gels with hydrated surfaces were functions of the no. of hydrated SiO_2 mols. on the gel surface; this showed that the adsorption resulted from the formation of H-bonds between the H_2O mols. and the OH^- on the gel surface. The thermal history of the gels and their pore diams. affected very little the reversible adsorption of water vapors. The area of the gel surface occupied by 1 mol. of water was 25 sq. A.

W. M. Sternberg

KISELEV, A.V.

ISIRIKYAN, A.A.; KISELEV, A.V.

Heat of adsorption of n-hexane and n-heptane vapors on silica gels [with summary in English]. Zhur.fiz.khim. 31 no.9:2127-2137

(MIRA 11:1)

S '57.

1. Moskovskiy Gosudarstvennyy universitet im. M.V. Lomonosova.
(Heat of adsorption) (Hexane) (Heptane)

KISELEV, A.V.

76-10-7/34

AUTHORS: Zhdanov, S.P., Kiselev, A.V.

TITLE: The Chemical Structure of Quartz and Silica Gel Surfaces and Their Hydration (O khimicheskom stroyenii poverkhnosti kvartsa i silikagelya i yeye gidratatsii)

ABSTRACT: Silica gel is an isomorphous body, the SiO_4-tetrahedrons have no spatial order, the distances between the silicon atoms are not constant in it. They can however, not differ considerably from the distance in the crystalline modifications of silicon. In order to be able to estimate approximatively the minimum amount of ω_{OH} for silica gel, data referring to the structure of one of the crystalline modifications of silicon, e.g. of the α-quartz, can be used. Here the structure of the quartz fission surface and the silica gel surface are investigated at various states of the surface, as well as the influence of the dehydration and the hydration of the silica gel on its adsorption properties. The mean surface taken by the OH-group at the quartz- and silica gel surface in the case of a maximum hydra-

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tion is determined and the number of hydroxides on the unit of this surface is computed. These quantities agree with those determined after the dehydration of the silica gel surface and the irreversible adsorption of water at it. It is shown that a dehydration of the silica gel with great pores at $650°$ in vacuum reduces considerably the absolute amount of the water vapor adsorption and gives a concave shape to the adsorption isotherm. It is shown that in the case of a surface dehydrated to a great extent the chemosorption of the water renews the adsorption properties of silica gel. There are 6 figures, 1 table, 15 Slavic references.

ASSOCIATION: Institute for Chemistry of Silicates, USSR Ac. of Sc.) / Moscow State University imeni M.V. Lomonosov (Akademiya nauk SSSR, Institut khimii silikatov; Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova)

Card 2/2

KISELEV, A.V.

76-12-5/27

AUTHORS: Karnaukhov, A.P., Kiselev, A.V.

TITLE: On the Theory of the Corpuscular Structure of the Adsorbents. The Capillary Condensation and the Hysteresis of Sorption in Interspaces Between Regularly Packed Spheres (K teorii korpuskulyarnoy struktury adsorbentov. Kapillyarnaya kondensatsiya i sorbtsionnyy gisterezis v zazorakh mezhdu pravil'no upakovannymi sharami).

ABSTRACT: The authors undertook a theoretical description of the capillary condensation and especially of the capillary condensation hysteresis in systems of spherical particles with various packages. The treatise comprises 3 stages: 1.) Computation of capillary condensation in model systems of correctly packed spheres. 2.) Computation of the capillary condensation and polymolecular adsorption taking place commonly in these systems. 3.) Analysis of possible deviations of these computations for systems with disordered package of the spheres, and a comparison of the results obtained with the test data. The present report gives the results of the first stage of investigation: 1.) An idea is given on the pores existing between the spheres in the case of correct packing with the coordination numbers 12, 8, 6 and 4. 2.) The capillary condensation in systems of spherical particles in

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On the Theory of the Corpuscular Structure of the Adsorbents. 76-12-5/27
The Capillary Condensation and the Hysteresis of Sorption in the
Interspaces Between Regularly Packed Spheres

contact consists essentially of the vapor condensation round the
sphere contact points and the intermittently filling of the narrowed
intervals between the particles. This filling subsequently disperses
in the remaining pore space. The reason for the development of the
hysteresis at vapor condensation and with the vaporation of the
fluid in such systems is shown. 3.) With a packing with the coordi-
nation number 4, the capillary condensation (without polymolecular
adsorption) is limited to one stage. It is the stage of reversible
filling of the space round the contact points of the spheres. 4.)
Computations of the isotherms with the capillary condensation of the
nitrogen vapors in packings of spherical silica particles with a dia-
meter of 100, 200 and 400 Å, as well as coordination numbers 12, 8,
6 and 4 were carried out. There are 8 figures, 1 table, and 16 refe-
rences, 7 of which are Slavic.

ASSOCIATION: Moscow State University imeni M.V.Lomonosov (Moskovskiy gosudarst-
vennyy universitet im. M.V.Lomonosova).

SUBMITTED: July 11, 1956

AVAILABLE: Library of Congress
Card 2/2

69-20-3-7/24

AUTHORS: Avgul', N.N.; Berezin , G.I., Kiselev, A.V.; Korolev, A.Ya.

TITLE: The Heat of Adsorption of Hydrocarbons on Carbon Blacks of
             Different Degrees of Graphitization (Teplota adsorbtsii ug-
             levodorodov na sazhakh s razlichnoy stepen'yu grafitirova-
             niya)

PERIODICAL: Kolloidnyy zhurnal, 1958, vol XX, Nr 3, pp 298-304 (USSR)

ABSTRACT: In the article the adsorption isotherms and the differential
             heats of adsorption of 3-methylhexan and benzene on the black
             sferon-6, graphitized at 2,800°C, were studied. In Graph 1,
             the absolute adsorption isotherms of the two vapors on black
             sferon-6 heated to 1,700 and 2,800°C are represented. Both
             coincide, i.e. the temperature has no influence on the ad-
             sorption properties of blacks. The heats of adsorption of
             hydrocarbons on carbon black graphitized at 2,800°C are close
             to the theoretical values for the potential of adsorption
             forces calculated previously.
             There are 4 graphs, 3 tables, and 17 references, 13 of which
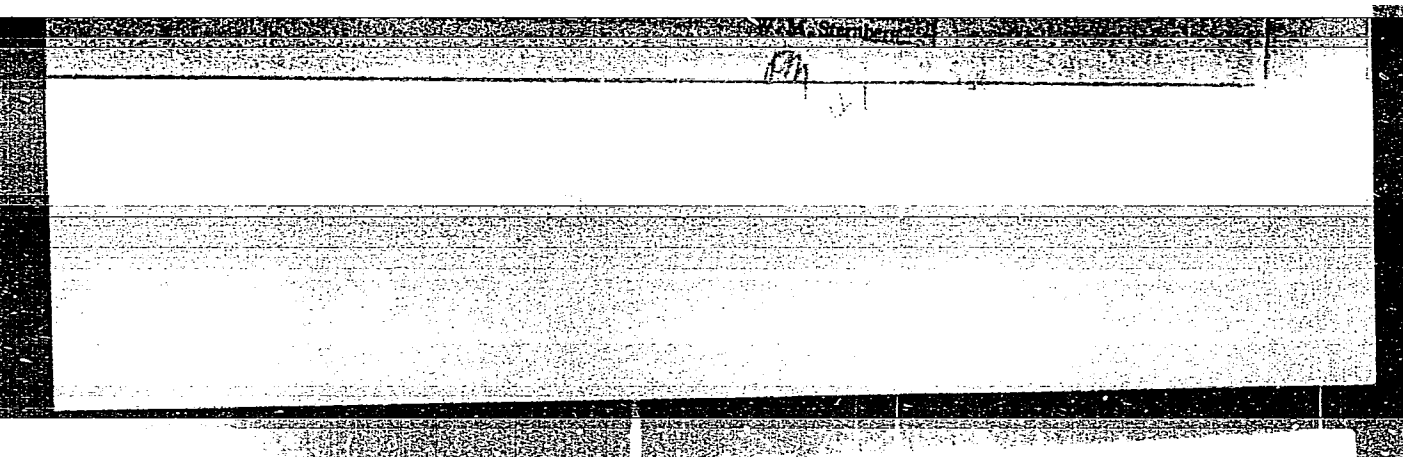Card 1/2   are Soviet and 4 English.

Inst Phys Chem) AS USSR, Lab of Sorption Processes

Kiselev, A.V.

...screening of isoalkanes, the chair...

KISELEV, A.V.

20-2-41/62

AUTHOR

TITLE

ISIRIKYAN,A.A. and KISELEV,A.V.
Heat of Benzene and Hexane vapor Adsorption on Calcined
and Hydrated Silica.
(Teplota adsorbtsii parov benzola i geksana na prokalen-
nom i gidratirovannom kremnezemakh.- Russian)

PERIODICAL

Doklady Akademii Nauk SSSR 1957, Vol 115, Nr 2,
pp 343-346 (U.S.S.R.)

ABSTRACT

It was proved by a number of papers that changes of the
chemical composition of the silicagel surface due to
surface reactions, such as dehydration, etherification
and haloidation, sharply alter its properties of adsorp-
tion toward the adsorbed substances. This concerns sub-
stances which are not only absorbed due to general inter-
actions of dispersion, but also due to additional
closer interactions, e.g. of an acid-basic type. The
thermal dehydration of silicagel leads to a reduction
of the adsorption of methanol and benzene vapors in the
initial part of the isotherm. The vapor adsorption of a
saturated hydrocarbon (n-heptane) is, however, not chan-
ged by the dehydration of silicagel at 200-400°C. In
the present paper the influence of the degree of dehy-
dration of the silicagel surface on the values of

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20-2-41/62

Heat of Benzene and Hexane Vapor Adsorption on Calcined
and Hydrated Silica.

differential heat, as mentioned in the title, is studied.
An improved variety of an earlier described set was used
for measurement. Silica in form of "white soot" was chosen
as initial adsorbent. Its production method excluded the
formation of a solid layer of hydroxyl groups of silicic
acid on the surface. Ill.1 gives complete isotherms of
benzene vapor adsorption on the initial and hydrated
sicilca sample. It follows from the illustration that the
samples are porous. In the region of capillary conden-
sation the isotherms of both samples are very similar,
but in the initial (purely adsorptive region) the iso-
therm of the hydrated sample rises much higher in spite
of its smaller specific surface. It is clearly to be
seen from ill. 2 that the adsorption surface increases
in relation to benzene, due to hydration of the silica
surface. Ill. 3 gives the differential adsorption heats
of benzene and hexane on a calcined and hydrated silica
sample as dependent on the absolute value of adsorption α
(μ Mol/m^2) in the region of monomolecular content. The
adsorption heat of hexane vapors is little sensitive to
an abrupt change in the degree of surface hydration of
this sample, as it is the case in benzene. The obtained

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20-2-41/62

Heat of Benzene and Hexane Vapor Adsorption on Calcined
and Hydrated Silica.

values of differential adsorption heats of the present
hydrocarbons and their relation to surface hydration
show that the fundamental interactions with the sili-
cagel surface represent the non-plar ones of Van der
Vaal. Their energy, however, is smaller than in the case
of adsorption on graphite due to a scarcer arrangement
of centers of forces in the quarts lattice. The absence
of a sharp influence of the increase in hydroxyl concen-
tration on the silica surface upon the adsorption heat
of hexane indicates a low enegery condent in the usual
interactions of induction. In the case of benzene ad-
sorption the formation of π-complexes with silicic acid
on the hydrated surface only increases the total heat of
adsorption of benzene Q_3 by 10 %, but the pure adsorption
heat Q_3 - L is strongly increased by it (close to θ = 0,5
it is about doubled). Thereby the form of the isotherm
of benzene vapor adsorption is highly changed.

CARD 3/4

KISELEV, A.V.

20-6-29/47

AUTHOR: Kiselev, A. V.

TITLE: The Adsorption of Vapors in Formations of Complexes of the Molecules of the Adsorbate on the Surface (Adsorbtsiya parov pri obrazovanii na poverkhnosti kompleksov iz molekul adsorbata)

PERIODICAL: Doklady AN SSSR, 1957, Vol. 117, Nr 6, pp. 1023 - 1026 (USSR)

ABSTRACT: The author investigates the absorption of vapor with consideration of the spreading of the complexes of the molecules of the adsorbate vertical to the surface and along the surface. The author deals with the adsorption of a vapor on a homogeneous surface which does not bear any centers specific for the given adsorbate. The general case of Van der Waals (Van-der-Vaal's)'s interactions in the surface layer is investigated. In this connection the author employs the method of quasichemical equilibriums and examines a chain of quasichemical reactions: 1) The primary reaction of the production of individual complexes (vapor-molecule + free surface ⇌ individual complex). An expression for the constant of the equilibrium is given. 2) The production of multiple complexes along the surface: Individual complex + individual complex ⇌ twofold horizontal complex, individual complex + twofold horizontal complex ⇌ threefold horizontal complex etc. (The possibility of

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20-6-29/47

The Adsorption of Vapors in Formations of Complexes of the Molecules of the Adsorbate on the Surface

the production of multiple complexes from multiple ones is disregarded here). The constants of the equilibrium are also given for this case. Then the equation of the isotherms of the adsorption is given and a way to their solution is shown. 3) The production of vertical complexes: a) Twofold vertical complexes form in those parts which do not carry any vertical complexes. The corresponding quasichemical reaction has the form vapor-molecules + complexes of the first layer which are open toward the top ⇌ twofold vertical complexes. b) The production of threefold, fourfold etc. vertical complexes: vapor-molecules + twofold vertical complexes ⇌ threefold vertical complexes etc. The constants of the equilibriums are given for these cases, too. The total adsorption is equal to the sum of adsorption in the vertical complexes of the different types. Then the equation of the polymolecular adsorption with consideration of the production of the horizontal complexes is written down and linearized. This equation describes the isotherms of the polymolecular adsorption with a convex and also with a concave initial part. Only a approximate description of the adsorption of vapors was given in the present paper. There are 14 references, 9 of which are Slavic.

Card 2/5

2   Inst. Phys. Chem., AS USSR

KISELEV, A·V·

24(6)   p.3   PHASE I BOOK EXPLOITATION   SOV/1408

Soveshchaniye po metodam issledovaniya struktury vysokodispersnykh i poristykh tel.
   2d, Leningrad, 1956.

Metody issledovaniya struktury vysokodispersnykh i poristykh tel; trudy vtorogo
   soveshchaniya (Methods of Investigating the, Structure of Highly Disperse
   and Porous Bodies; Transactions of the Second Conference) Moscow, Izd-vo AN
   SSSR, 1958. 294 p. 2,000 copies printed.

Sponsoring Agencies: Akademiya nauk SSSR. Institut fizicheskoy khimii and
   Institut khimii silikatov.

Resp. Ed.: Dubinin, M.M., Academician; Ed. of Publishing House: Razumova, L.L.;
   Tech. Ed.: Markovich, S.M.

PURPOSE: This book is intended for scientists, teachers and advanced students
   interested in the structural analysis of highly disperse and porous bodies.

COVERAGE: This collection contains reports by members of various Soviet insti-
   tutions of higher education: Institute of Physical Chemistry, AS UkrSSR;

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      5

Methods of Investigating the Structure of Highly (Cont.)   SOV/1408

Institute of Chemistry, AS Georgian SSR; Far Eastern Branch, AS USSR;
Georgian Scientific Research Institute for Petroleum; State Optical Insti-
tute; Leningrad Technological Institute; Moscow and Leningrad State Universi-
ties; Far Eastern Polytechnic Institute; "Agrophysical" Institute, and others.
Introductory remarks were made by Professor N.A. Toropov, Director of the
Institute of Silicate Chemistry. Apart from reports under the four subject
divisions (see Table of Contents), the collection includes discussions, con-
siderations and proposals adopted at the close of the conference.

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5

Methods of Investigating the Structure of Highly (Cont.)   SOV/1408

Card 3/9
5

KISELEV, A. V.,   (Moscow)

"The Corpuscular Structure of Xerogels and Its Influence on the Adsorption Properties,"

paper presented at the Bristol Symposium on the Structure and Properties of Porous Materiels, Bristol, UK, 24-27 Mar 58.

B-3,107,523

KISELEV, A.V.

62-58-4-2/32

AUTHORS: Kiselev, A.V., Khrapova, Ye. V.,

TITLE: Adsorption of Nitrogen Vapors on Graphitized Carbon
              Blacks and Charcoals (Adsorbtsiya parov azota na grafi-
              tirovannykh sazhakh i ugle)

PERIODICAL: Izvestiya Akademii Nauk SSSR,Otdeleniye Khimicheskikh Nauk,
              1958, Nr 4, pp. 389 - 402 (USSR)

ABSTRACT: In papers already published (References 1-4) the advantages
              of work with carbon black compared to other working methods
              (with active charcoal and graphites) was pointed out. The
              variety and surface roughness of carbon blacks can be
              essentially decreased by means of thorough heating (at high
              temperatures). In this an enlarging of the crystallites
              in carbon blacks is caused and the surfaces become more
              homogenous. The works of the authors contain many investi-
              gations dealing with the adsorption and the differential heat
              of adsorption of various vapors as well as of the adsorption
              of solutions on carbon black (References 1-4,10 -17,18,19).
              In this paper the authors deal with the investigation of the
Card 1/2   adsorption of nitrogen vapors on various samples of original

62-58-4-2/32

Adsorption of Nitrogen Vapors on Graphitized Carbon Blacks and Charcoals

and graphitized carbon blacks as well as of charcoal. By
annealing the carbon blacks their rough surface was remark-
ably homogenised. The annealing of charcoal on the same
conditions causes the destruction of part of the pores which
leads to an essential decrease of the pore size. The iso-
thermal line of the adsorption of nitrogen vapors on char-
coal increases more rapidly than on carbon black. The iso-
thermal lines of the adsorption of krypton and methane
vapors on graphitized substances with homogenous surface
show a step-form below the critical temperature of the
adsorption layer. Above the critical point the isothermal
lines do not show a break and keep their wave character.
There are 11 figures, 1 table, and 47 references, 22 of
which are Soviet.

Card 2/2
2

Moscow State Univ.
Inst. Phys. Chem. AS USSR

SOV/55-58-6-30/31

AUTHORS: Gerasimov, Ya. I., Yeremin, Ye. N., Kiselev, A. V., Lebedev, V. P., Skuratov, S. M., Topchiyeva, K. V., Shakhparonov, M. I.

TITLE: Training and Education of Teachers of Higher Schools, and of Scientists and Researchers (O putyakh podgotovki prepodavateley vysshey shkoly i nauchnykh rabotnikov)

PERIODICAL: Vestnik Moskovskogo universiteta. Seriya matematiki, mekhaniki, astronomii, fiziki, khimii, 1958, Nr 6, pp 235 - 238 (USSR)

ABSTRACT: According to the opinion of the authors the actual training and education of qualified specialists in the field of natural sciences suffers from certain drawbacks: They first go through a three-years' stage as candidates. This kind of activity is in no way a guarantee for thoroughly penetrating into all necessary fields of theoretical and experimental work in the domain of physics and physical chemistry, and of the other sciences related therewith. Besides the time is too short for defending and proving again the truth of the scientific investigations carried out. It is obvious that the brevity of time prevents the candidates from ascending in their investigations from a perfunctory to a more scientific level. There is no possibility of selecting certain more interesting themes,

Card 1/3

and the like. Finally the time is too short for giving the
candidate a sufficient pedagogical training. Consequently, it
is suggested to replace the term of three years for candidates
by a five years' term for assistants-on-trial during which time
the practical work and the seminaries will be conducted accord-
ing to pedagogical principles and the scientific investigations
will be carried out in accordance with the plans of the Chair.
The examination on the special scientific training can only
be passed, if the assistant-on-trial adduces the proof of having
made a number of particular scientific reports, and of having
passed the examination on the fundamentals of marxism and
leninism, as well as that of foreign languages. After having
completed his trial term and having successfully passed the
final examination, he may become candidate lecturer at his own
or at any other school. By a well-controlled guidance of the
assistant-on-trial, an excellent selection is warranted of
first-class men of science. Besides, this system will success-
fully further and advance the scientific work of the assistants-
on-trial. The authors believe that the chief result of this

Card 2/3

Training and Education of   Teachers of Higher   SOV/55-58-6-30/31
Schools, and of Scientists and Researchers

reorganisation will be a good training both in the scientific
sector and, in the pedagogical field, and will therefore be
the best way of forming first-class higher school instructors.

Card 3/3

SOV/62-58-6-2/37

AUTHORS: Kiselev, A. V., Khopina, V. V., El'tekov, Yu. A. (With the Participation of Klyachko-Gurvich, A. I)

TITLE: The Adsorption of the Toluene- and Heptane Mixture on Silica--Gels and Carbon Blacks (Adsorbtsiya smesi toluola i geptana na silikagelyakh i sazhakh)

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye khimicheskikh nauk, 1958, Nr 6, pp. 664-672 (USSR)

ABSTRACT: The present paper is a continuation of several earlier ones (Refs 9, 11, 12) and deals with the investigation of the adsorption of toluene from solutions in heptane on silica gels of various structures. Numerous authors (Refs 4, 6, 13, 14) recommend this system(for the purpose of determining the specific surface of catalysts and adsorbents). A definition was given of the isothermal lines for the adsorption of toluene from solutions in n-heptane on silica-gels having various degrees of porosity. The thickness of the monomolecular adsorption layer of toluene amounts to 3.7 $\overset{o}{A}$, the molecules of toluene are oriented flat on the surface of the silica-gel. The narrowing of pores on silica-gel from 104 to

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The Adsorption of the Toluene- and Heptane Mixture on Silica-Gels and Carbon Blacks

SOV/62-58-6-2/37

30 $\overset{o}{A}$ (by which the adsorption potential is increased) increases the adsorption of toluene within the range of low concentrations and causes a shifting of the isothermal maximum for thin-pored samples in the direction of lower concentrations. The prevailing adsorption of aromatic hydrocarbons and olefines on silica-gel is connected with two factors: with the intensity of the interaction between aromatic nuclei and the hydroxylene of the silicon acid, and the influence exercised by substituents. In this way the surface occupied by a molecule on the silica-gel surface is increased. On carbon--black with an acid surface (from heptane solutions) toluene is adsorbed throughout the entire area of concentration (but not to the same extent as on silica-gel). Carbon-black graphiting reduces the adsorption of toluene considerably. There are 8 figures, 1 table, and 26 references, 18 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova i Institut fizicheskoy khimii Akademii nauk SSSR
(Moscow State University imeni M. V. Lomonosov and Institute of Physical Chemistry, AS USSR)

Card 2/2

3-58-7-3/36

AUTHORS: Gerasimov, Ya.I., Yeremin, Ye.N., Kiselev, A.V., Skuratov, S.M., Topchiyeva, K.V., Professors; Shakhparonov, M.I., Doctor of Chemical Sciences and Lebedev, V.P., Dotsent

TITLE: The National Economy Needs Physico-Chemists (Narodnomu khozyaystvu nuzhny fiziko-khimiki)

PERIODICAL: Vestnik vysshey shkoly, 1958, Nr 7, pp 14-16 (USSR)

ABSTRACT: The authors stress the necessity of creating special faculties on physico-chemistry in universities. At present, faculties train chemists whose knowledge of physics is rather limited. The student is not trained in a special branch of chemistry, and the shortage of time does not allow him to develop his knowledge of practical methods.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet imeni Lomonosova (The Moscow State University imeni Lomonosov)

Card 1/1

SOV/63-3-6-20/43

AUTHOR: Kiselov, A.V., Professor

TITLE: Symposium on the Structure and the Properties of Porous Bodies
             in Bristol (Simpozium po strukture i svoystvam poristykh tel
             v Bristole)

PERIODICAL: Khimicheskaya nauka i promyshlennost', 1958, Vol III, Nr 6,
             pp 815-816 (USSR)

ABSTRACT: Adsorbents, catalysts, coal, building materials, textile
             fibers, etc are all highly porous bodies. In March 1958 a
             symposium took place in Bristol dealing with the structure and
             properties of porous bodies. About 70 specialists attended
             the symposium and presented 15 papers and read 1 lecture. In
             the first session Professor Barrer presented a paper on
             sorption in porous crystals and Professor Winn-Jones on the
             characteristic of coal surfaces. The papers of the second
             session were read by Professor de Boer and Professor Everett
             on the relation of the pore structures to adsorption pheno-
             mena. Professor Desay dealt with the passing of gas through
             the pores of coal. Professor Kiselev read a paper on the in-
             fluence of geometrical and chemical modification on ad-
             sorption properties, Doctor Shoffield on the influence of
             surface charges on the properties of porous bodies, N.M.
             Kavtaradze on the structure of metal films, King on the porous

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SOV/65-3-6-20/43

Symposium on the Structure and the Properties of Porous Bodies in Bristol

structure of wool and nylon, Professor Preston on the movement
of liquids in plants and trees, and Honeyborn on the structure
of porous construction stones and their resistance to the in-
fluence of the weather.

Card 2/2

SOV/65-58-12-6/15

AUTHORS: Kiselev, A. V. and Nikitin, Yu. S.

TITLE: The Effect of Thermal and Vapour Treatment on the Structure and Catalytic Activity of Aluminium Silicate Bead Catalysts (Vliyaniye termicheskoy i parovoy obrabotok na strukturu i kataliticheskuyu aktivnost' sharikovykh alyumosilikatnykh katalizatorov)

PERIODICAL: Khimiya i Tekhnologiya Topliv i Masel, 1958, Nr 12, pp 27 - 32 (USSR)

ABSTRACT: Thermal over-heating and the action of water vapour constitute serious factors during the poisoning of aluminium silicate catalysts and cause a decrease in the activity and structural changes of the same (Ref. 1 - 7). Variations in the catalytic activity due to piercing of the catalysts at high temperatures, and their treatment with vapour, were compared with changes in their porous structure. Five bead catalysts with similar chemical composition were tested. They were subjected to calcination and vapour treatment in an air current. These tests were carried out in a vertical kiln in a quartz reactor. Adsorption and desorption isotherms of methanol at 20°C were determined for each sample. The structural characteristics of the

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SOV/65-58-12-6/18

The Effect of Thermal and Vapour Treatment on the Structure and Cata-
lytic Activity of Aluminium Silicate Bead Catalysts

catalysts were calculated from these isotherms. The
catalytic activity was evaluated after cracking of a
kerosine-gas-oil fraction of Artem-Malgobek petroleum
at 450°C; the experiment was carried out for 30 min-
utes. A table gives data on the structural charac-
teristics of the catalyst as well as yields of gasoline,
(fraction up to 200°C), gas, coke and on the rate of
conversion. Structural changes during thermal treatment
differ largely from those observed during vapour treat-
ment. Calcination of the catalyst at temperatures
above 750°C causes a contraction in the specific sur-
face which is approximately proportional to the con-
traction of the pore volume. The dimensions of the
pores do not change. A slighter decrease in the volume
of the pores is observed during vapour treatment, but
the dimensions of the pores increase rapidly (Fig.1).
Equations for calculating these parameters are given.
Variations in the activity of the catalysts (viz Table)
also point to a sharp decrease in the cracking activity
Card 2/4   of aluminium silicate catalysts. The depth of conversion

SOV/65-58-12-6/16

The Effect of Thermal and Vapour Treatment on the Structure and Cata-
lytic Activity of Aluminium Silicate Bead Catalysts

by heat- and vapour-treated catalysts was also compared.
Large-grain heat- and vapour-treated catalysts had
approximately the same effect (depth of conversion equals
$0.29 - 0.31 \times 10^{-2}$). Fine-grain catalysts are less
effective (depth of conversion equals approximately
0.22×10^{-2}). Equations are derived for calculating
the depth of conversion and it is suggested that altera-
tions in the activity of the catalysts are connected
with variations in the weight of $1 m^3$ of dry granular
material (Fig.2). At equal deposition the activity
of the sample, calcinated at high temperatures is con-
siderably higher than the activity of samples treated
with vapour at $750^\circ C$. During vapour treatment the speci-
fic surface decreases at a much faster rate than the
deposition of the catalyst; therefore, the activity

Card 3/4   of the vapour-treated catalyst decreases much quicker than

SOV/65-58-12-6/16

The Effect of Thermal and Vapour Treatment on the Structure and Cata-
lytic Activity of Aluminium Silicate Bead Catalysts

that of the heat treated catalyst. There are 2 Figures,
1 Table and 17 References: 8 Soviet and 9 English.

ASSOCIATION: Khimicheskiy fakul'tet MGU, VNII NP (The Department of
Chemistry MGU, VNII NP)

Card 4/4

GERASIMOV, Ya.I.; YEREMIN, Ye.N.; KISELEV, A.V.; LEBEDEV, V.P.; SKURATOV,
    S.M.; TOPCHIYEVA, K.V.; SHAKHPARONOV, M.I.

Methods of preparing scientific workers and teachers of insti-
tutions of higher education. Vest.Mosk.un.Ser.mat.,mekh.,astron.,
fiz.,khim. 13 no.1:235-238 '58.   (MIRA 12:4)
                    (Science--Study and teaching)

KISELEV, A.V.

69-20-1-8/20

AUTHORS: Kiselev, A.V.; Lygin, V.I.; Neymark, I.Ye.; Slinyakova, I.B.;
Chen' Ven'-khan.

TITLE: Electron Microscopic and Adsorption Studies of Silica Sols
and Silica Gels (Elektronno-mikroskopicheskoye i adsorbtsion-
noye issledovaniya silikazoley i silikageley)

ABSTRACT: The globular theory of the structure of many gels (silica-
gels, alumo-silica-gels, titano-gels) postulates that the
framework of these gels is made of ball-shaped primary par-
ticles. In the article the results of an electron microscopic
study are represented. The substances investigated are sta-
bilized sols, peptized hydro-gels washed with liquids of dif-
ferent pH, and xerogels obtained from these hydrogels. The
sols and hydrogels were investigated after application and
drying on a collodion support. The collodion supports by
applying a 1%-solution of collodion in amylacetate on the
surface of distilled water. Hydrosols were investigated by
making a carbon replica of them. A carbon film of 100 ang-
strom was applied in a vacuum device by means of thermal

Card 1/3

69-20-1-8/20

Electron Microscopic and Adsorption Studies of Silica Sols and Silica
Gels

spraying. The carbon film is fixed by paraffin and shaded
by chromium. The obtained replica has a dissolution of
50 angstrom and is investigated by means of the electronic
microscope UEM-100 working with 60 kv. The sol particles
of 50-100 angstrom form in the early stages of the colloid
before the formation of the hydrogel. During further gel
formation the size of the particles is not increased. The
electron microscopic investigation of xerogels is more dif-
ficult, because the dense framework does not allow a detailed
analysis. Carbon replicas were used, therefore, to investi-
gate the porous structure. Fig. 3, v,g, represents the ste-
reomicrophotography of a xerogel, the initial hydrogel of
which has been washed by a liquid with a pH of 10.2. In
fig. 3,d, the hydrogel has been washed with a liquid of pH
8.2. The adsorption method leads to the same results: the
adsorption isotherms of methanol vapors and the distribution
curves of the pore diameters show that a decrease in the
pH value of the washing liquid causes the formation of

Card 2/3

69-20-3-14/24

AUTHOR: Kiselev, A.V.

TITLE: Adsorbate-Adsorbate Interaction in the Adsorption of Vapors
               on Graphitized Blacks (Proyavleniye vzaimodeystviya adsorbat-
               adsorbat pri adsorbtsii parov na grafitirovannykh sazhakh)
               1. The Equations for the Vapor Adsorption Isotherm,Consider-
               ing the Interaction Adsorbate-Adsorbate (1. Uravneniya izo-
               termy adsorbtsii parov, uchityvayushchiye vzaimodeystviya
               adsorbat-adsorbat)

PERIODICAL: Kolloidnyy zhurnal, 1958, vol XX, Nr 3, pp 338-348 (USSR)

ABSTRACT: Molecules of an adsorbing substance getting into an adsorp-
               tion layer interact one with another. The influence of this
               interaction is generally explained as due to the non-homo-
               geneity of the surface. Recently, methods for the production
               of adsorbents with a homogeneous surface have been devised.
               These adsorbents permit the measuring of the adsorption as
               well as of the adsorption heat. Such adsorbents are sur-
               faces of blacks graphitized at temperatures higher than
               1,500°C. The interaction adsorbate-adsorbate is experi-
               mentally the clearer, the stronger this interaction is, and
               the weaker the interaction of the adsorbate-adsorbate is. In
Card 1/2   the article, various equations for isotherms of monolayer ad-

69-20-3-14/24

Adsorbate-Adsorbate Interaction in the Adsorption of Vapors on Graphitized Blacks. 1. The Equations for the Vapor Adsorption Isotherm,Considering the Interaction Adsorbate-Adsorbate

sorption are represented which take into account the adsor-bate-adsorbate interaction from the gaseous phase on a homo-geneous surface. Approximate equations for mono- and poly-molecular capor adsorption have been derived by the method of quasi-chemical equilibrium. These equations describe the ad-sorption isotherms with one and two points of inflexion. The form of the adsorption isotherm and its initial curvature is determined by the values and the relation of the two equili-brium constants adsorbate-adsorbent (K_1^i) and adsorbate-ad-sorbate (K_n). For $K_n = 0$ the equations transform to the Lang-muir or Brunauer-Emmett-Teller type $\underline{/}$Ref 2 and 4$\underline{/}$.

There are 10 graphs, 1 table, and 34 references, 17 of which are Soviet, 15 English, and 2 American.

ASSOCIATION: Laboratoriya adsorbtsii,Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova (Laboratory of Adsorption, Moscow State University imeni M.V. Lomonosov)

SUBMITTED: February 24, 1958
Card 2/2

1. Carbon black—Vapors   2. Vapors—Absorption

SOV-69-58-4-8/18

AUTHORS: Kiselev, A.V., Kovaleva, N.V., Sinitsyn, V.A., Khrapova, Ye.V.

TITLE: Adsorbate-Adsorbate Interactions in Vapor Adsorption on
            Graphitized Carbon Blacks (Proyavleniye vzaimodeystviya ad-
            sorbat-adsorbat pri adsorbtsii parov na grafitirovannykh
            sazhakh)
            2. Application of Adsorption Isotherm Equations for Descrip-
            tion of Experimental Data (2. Primeneniye uravneniy izoterm
            adsorbtsii dlya opisaniya eksperimental'nykh dannykh)

ABSTRACT: In the article the equations of Reference 1 for the isotherms
            of mono- and polymolecular adsorption of vapors are applied to
            the description of the experimental isotherms of adsorption on
            graphitized carbon black. The adsorption of n-alkanes is de-
            scribed by the isotherm equations 1 and 4, which are similar
            to the equations of Langmuir and Brunauer-Emmett-Teller. The
            isotherm of cyclopeptan adsorption has two inflexion points
            and is described by equation 4. The experimental isotherms
            and adsorption heats of nitrogen, argon, and krypton vapors on
            the carbon black R-33, graphitized at 2,700° C. At a tempera-

Card 1/3

Adsorbate-Adsorbate Interactions in Vapor Adsorption on Graphitized Carbon Blacks. 2. Application of Adsorption Isotherm Equations for Description of Experimental Data

ture of $-183°$ C, the pure initial adsorption heat is 0.8 kcal/mole. It has been found that the adsorption isotherms follow for values $\theta < 0.1$ the equation of Henry, from 0.1-0.5 the equation of Hill (2) and for higher values the equation of Langmuir. θ is the general degree of filling of the surface by the monolayer. Figure 1 shows that the adsorption isotherms for nitrogen vapors calculated according to Hill's equation coincide with the experimental values only to $\theta = 0.4$ and then incline downward. The Langmuir equation is applied for higher values. Figure 4 shows the adsorption heats of argon vapors and the adsorption isotherms calculated according to the equations 1 and 2. The pure initial adsorption heats amount to 0.7 kcal/mole. Figure 5 represents the experimental adsorption isotherms of krypton vapors at $-183°$ C and $-195°$ C from Reference 13 as well as the calorimetric adsorption heats at $-183°$ C from Reference 15. The pure initial adsorption heat is 1.5 kcal/mole. It has been found that equation 3 corresponds well to the experimental data. Figure 7 shows the

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Adsorbate-Adsorbate Interactions in Vapor Adsorption on Graphitized Carbon
Blacks. 2. Application of Adsorption Isotherm Equations for Description of
Experimental Data

adsorption isotherms for nitrogen, argon, and krypton vapors
at high vapor pressure values. In the case of nitrogen and
argon at these values, polymolecular adsorption sets in.
Equation 4 gives good results for nitrogen. For argon, the
calculated values are higher. The adsorption isotherms of
krypton have a step-shaped character. Equation 4 is used.
Figure 8 shows the isotherm and the adsorption heat for SO_2
vapors at 0° C on carbon black sferon-6 graphitized at $2,700^\circ$ C.
The pure initial adsorption heat is approximately equal to
the condensation heat and reaches a maximum of 1.5 kcal/mole
at a vapor pressure of 0.2. The experimental facts are well
described by the equations 1 and 2. Figure 11 shows the iso-
therms and the adsorption heats for ammonia at -78.8° C and
methylamin at 0° C. The ammonia isotherm has no inflexion
point, whereas the methylamin isotherm has two inflexion points.
Equation 4 and Hill's equation are applied to the experimental
data. It has been established, that in the same measure as the
Card 2/5   adsorbate-adsorbent interactions decrease and the adsorbate-

SOV-69-58-4-8/18

Adsorbate-Adsorbate Interactions in Vapor Adsorption on Graphitized Carbon
Blacks. 2. Application of Adsorption Isotherm Equations for Description of
Experimental Data

          adsorbate interactions relatively increase; the isotherms
          change their shape from convex at the initial part with
          single points of inflexion (n-alkanes) to initially concave,
          with two points of inflexion (nitrogen, argon, krypton, sulfur
          dioxide, methylamin, etc.) and to concave throughout with no
          inflexion (water).
          There are 12 graphs, 1 table, and 29 references, 14 of which
          are Soviet and 15 English.

ASSOCIATIONS: Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova,
          Laboratoriya adsorbtsii (Moscow State University imeni M.V.
          Lomonosov, Laboratory of Adsorption)
          Institut fizicheskoy khimii AN SSSR, Laboratoriya sorbtsionnykh
          protsessov (Institute of Physical Chemistry of the Academy of
          Sciences of the USSR Laboratory of Sorption Processes)

Card 4/5

SOV/32-24-9-16/53

AUTHORS: Kiselev, A. V., Shikalova, I. V.

TITLE: The Determination of the Specific Surface of Soot by the Method of Adsorption From Solutions (Opredeleniye udel'noy poverkhnosti sazh metodom adsorbtsii iz rastvorov)

PERIODICAL: Zavodskaya Laboratoriya, 1958, Vol 24, Nr 9, pp 1074-1076 (USSR)

ABSTRACT: On the basis of a known, absolute adsorption isotherm, the adsorption from solutions can, according to literature data (Refs 1,2), be used for the rapid determination of the specific surface S. Once the absolute adsorption isotherm for the phenol-water-soot system is known, the specific surface can be determined more rapidly from one to two adsorption points using the same measuring technique as Kaunovskiy and Gofman (Kaunowski and Hofmann) (Ref 4). In the paper under review, the absolute isothermal lines of phenol from aqueous solutions were determined using three different soot samples: ukhtinskaya termicheskaya sazha (Ukhta thermal soot), Ukhta core soot, and Ukhta core soot graphitized at 1700°. The technique employed is described. The concentration of the solution in equilibrium can be determined by the aid of an interferometer of the type ITR-2 and a calibration curve, or by titration.

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SOV/32-24-9-16/53

The Determination of the Specific Surface of Soot by the Method of Adsorption
From Solutions

The amount of the adsorption x is calculated by a formula from
the initial concentration and the concentration of the solution
in equilibrium. The determination time for this method depends
on the time of the attainment of the adsorption equilibrium;
in series analyses, it does, however, not exceed one hour.
There are 2 figures, 1 table, and 6 references, 5 of which
are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova
               (Moscow State University imeni M. V. Lomonosov)

Card 2/2

Kiselev, A.V.

AUTHORS: Soboleva, L. N.,(Deceased)   76-1-7/32
              Kiselev, A. V.

TITLE: The Adsorption of Methanol Vapors on the Hydrated Surface
              of Silica Gels and Quartz (Adsorbtsiya parov metanola na
              gidratirovannoy poverkhnosti silikageley i kvartse).

ABSTRACT: The isotherms of the adsorption of methanol vapors of
              12 samples of silica of different porosity are compared.
              The absolute isothermal line of the adsorption of great-pore
              samples is defined exactly and it is compared with the ab-
              solute isothermal line of the adsorption of steam. The pore
              measurements are determined, at which a distortion of the
              methanol adsorption isothermal lines is noticeable. Isothermal
              lines for the absolute magnitudes of the adsorption α
              are graphed for quartz and 5 great-pore silica gels. For the
              purpose of explaining the influence of the narrowing of pores
              with the residual 6 samples (silica gel) the method for the
              construction of reduced adsorption isothermal lines
              (ref. s 18,4 and 10) was used. The authors showed that a
              narrowing of the silica gel pores below d = 30 Å noticeably

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The Adsorption of Methanol Vapors on the Hydrated Surface   76-1-7/32
of Silica Gels and Quartz

increases the methanol vapor adsorption. This stimulating
effect of the narrowing of pores, i.e. the approach of
primary particles, on the energy of methanol adsorption shows
in a much smaller scale than in the case of hydrocarbon vapor
adsorption with hydrocarbons with 4 and more carbon atoms
within a molecule (ref. 19) and is close to the corresponding
effect in the case of the adsorption of nitrogen vapors
(ref. 20). Contrary to the adsorption of steam (ref. 3) the
increase of adsorption energy is clearly visible here. This
is mainly due to the increase of the dispersion interactions
with silica gel of the methyl group of methanol. The authors
show that the isothermal lines of primary adsorption of
methanol vapors can be used for a reliable determination of
the specific surface of hydrated silica gels with pore
measurements of $d > 30 \, \text{Å}$ at room temperature. In the case
of fine-porous silica gels this determination becomes un-
reliable. The authors further show that the process of
adsorption of methanol vapors on a hydrated silica gel surface,
is very similar to that of the adsorption of water
Card 2/3   vapour and that it is mainly determined by the hydrogen com-

The Adsorption of Methanol Vapors on the Hydrated Surface   76-1-7/32
of Silica Gels and Quartz

compounds with the hydroxides of silica gel. A thermal
dehydration of the silica gel surface and its methoxylation
cause a decrease of the primary adsorption of methanol vapors.
O. M. Dzhigit assisted in the elaboration and preparation for
print.
There are 8 figures, 1 table and 27 references, 24 of which
are Slavic.

ASSOCIATION: Moscow State University imeni M. V. Lomonosov
             (Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova)

SUBMITTED: September 1, 1956

AVAILABLE: Library of Congress

Card 3/3

AUTHORS: Isirikyan, A. A., Kiselev, A. V.   76-32-3-28/43

TITLE: The Heat of Adsorption of Benzene Vapors on Silica Gels
              (Teplota adsorbtsii parov benzola na silikagelyakh)

PERIODICAL: Zhurnal Fizicheskoy Khimii, 1958, Vol. 32, Nr 3,
              pp. 679-688 (USSR)

ABSTRACT: The present work investigates the dependence of the heat
              of adsorption on the filling up of the surface and
              volume of pores of silica gels of different structure
              with hydrated surfaces. In the final domain of capillary
              condensation, sharp maxima of the heat of adsorption of
              the benzene vapors were observed and thoroughly examined.
              Similar maxima were found   in the adsorption
              of n-alkanes. From the data of the experimental part, it
              follows that a coarse-pored silica gel KCK-2 (specific
              surface s = 320 m²/g) and a fine-pored nc.8 (specific
              surface s = 520 m²/g) were used. As is to be seen from
              the given diagrams, the isothermal line of adsorption
              for coarse-pored silica gel is S-shaped and shows a
Card 1/3   capillary-condensation hysteresis, whereas in fine-pored

The Heat of Adsorption of Benzene Vapors on   76-32-3-28/43
Silica Gels

silica gel the hysteresis is less, but sharper. In
investigations of the heat of adsorption it was noticed
that at the beginning of filling up the surface, an
abrupt heat drop takes place which later continues to
fall linearly. This is in alkane adsorption explained
by the unevenness of the surface. A comparison of the
heats of adsorption of the two silica gel samples
shows that that of fine-pored silica gel is considerably
higher. The increased heat of adsorption of benzene on
a silica gel with hydrated surface is traced back to a
formation of π-complexes with the hydroxyl of silicic
acid. Thus A. N. Terenin in benzene adsorption on porous
glass showed that a decrease in the hydroxyl groups
takes place. Adsorption experiments in comparison with
graphite were performed and the obtained differences
were explained. The heats of wetting were calculated by
the integration of the curves of the pure heats of
adsorption. The maximum which the curve of the heat of
Card 2/3   adsorption and descrption shows in the capillary

The Heat of Adsorption of Benzene Vapors on   76-32-3-28/43
Silica Gels

condensation is explained by a compression and expansion
respectively of the liquid which fills up the pores of
the silica gel, in which connection samples with pores
of equal size were investigated. There are 8 figures,
1 table, and 23 references, 22 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova
                (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: December 29, 1956

Card 3/3

5(4)
AUTHORS: Kiselev, A. V., Poshkus, D. P.   SOV/76-32-12-26/32

TITLE: The Calculation of the Adsorption Energy of Hydrocarbons on
Magnesium Oxide (Raschet energii adsorbtsii uglevodorodov na
okisi magniya)

PERIODICAL: Zhurnal fizicheskoy khimii, 1958, Vol 32, Nr 12, pp 2824-2834
(USSR)

ABSTRACT: Previous papers (Refs 1 - 7) dealt with the adsorption energies
on graphite and the adsorption on atomic and ionic lattices.
Calculations for the magnesium oxide lattice were carried out
for the crystal plane (100). The adsorption heat of hydrocarbons
on MgO had been previously calculated and the results had been
reported at the Second International Congress of Surface
Activity held in London on April 1957. (Ref 1).- The adsorption
energy of combined molecules is understood on the basis of the
principle of additivity of molecular forces as being the
aggregate of series of power centers (Group centers CH_3, CH_2, CH).

The calculation of the aggregate energy of the interaction
takes account of the dispersion, induction and repulsion as well
Card 1/2   as of the interaction of the adsorbed molecules. The shares of

The Calculation of the Adsorption Energy of   SOV/76-32-12-26/32
Hydrocarbons on Magnesium Oxide

the dipole - dipole, dipole - quadrupole, and quadrupole - quadrupole forces of attraction were 81-83%, 12-14% and 3% of the entire energy respectively. For the saturated aliphatic n-hydrocarbons (alkanes) C_4 to C_8 (including n-heptane) as well as for benzene and toluene, a good agreement with the adsorption temperatures reported in publications was found. The energy of the electrostatic induction forces is very low, being only 2%. With regard to the adsorbent, the oxygen ions are of chief importance. Their dispersive interaction with magnesium ions amounts to approximately 15% of the entire dispersion effect. The repulsion energy amounts to about 40% to 48% of the aggregate energy of attraction. There are 5 tables and 34 references, 11 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova
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SUBMITTED: June 17, 1957

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20-119-2-30/60

AUTHORS: Belyakova, L. D., Kiselev, A. V.

TITLE: The Influence of Silicagel Surface Dehydration on the Adsorption of Benzene and Hexane Vapors (Vliyaniye degidratatsii poverkhnosti silikagelya na adsorbtsiyu parov benzola i geksana)

PERIODICAL: Doklady Akademii Nauk SSSR, 1958, Vol. 119, Nr 2, pp. 298-301 (USSR)

ABSTRACT: First the authors point to some previous works dealing with the same subject. The present paper investigates the dependence of the adsorption of benzene and hexane vapors on the concentration of the hydroxyl groups on the surface of macroporous silicagel KCK-2. The surface of this silicagel was changed by thermal dehydration in a vacuum. For this purpose the sample (~3g) was placed into the quartzshell of a vacuum apparatus and was annealed at 200, 400, 500, 650, 950 and 1020°C. After dehydration at each of these temperatures the isothermal lines of adsorption of the nitrogen vapors at -195°C

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on the Adsorption of Benzene and Hexane Vapors

same structure of the samples are presented, with a
different degree of hydration of the surface, however.
The isothermal line of the absorption of hexane vapors
on the hydrated surface of a silicagel is almost linear.
In the adsorption of hexane on silicagel a Van der Waals
interaction occurs; not only the atoms of the surface
of the adsorbent but also the atoms existing within the
particles of its skeleton take part in it. There are
4 figures and 18 references, 15 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova
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PRESENTED: August 10, 1957, by M. M. Dubinin, Member, Academy of
                Sciences USSR

SUBMITTED: June 26, 1957

Card 3/4

AUTHORS: Kiselev, A. V.

20-119-4-28/60

TITLE: The Adsorption Heat of the Vapors of Benzene and Hexane on
            Quartz (Teplota adsortsii parov benzola i geksana na kvartse)

PERIODICAL: Doklady Akademii Nauk SSSR, 1958, Vol. 119, Nr 4,
            pp. 731 - 734 (USSR)

ABSTRACT: In the course of this work an adsorption-colorimetric device
            is used for measuring the isothermal lines of adsorption and the
            differential adsorption heats of the vapors of benzene and
            H-hexane on a quartz powder up to saturation. The quartz powder
            had a specific surface of 6,0 m^2/g. A diagram shows the here
            obtained isothermal lines of the absolute values α(per surface
            unit) for the vapors of hexane and benzene. For benzene the iso-
            thermal line was plotted to full saturation. The isothermal
            lines are reversible up to relative pressures of $p/p_s \sim 0.9$
            and have the S-shape which is typical of the adsorption on non-
            -porous adsorbents. In the case of higher values of p/p_s a

            distinctly reproducible hysteresis was found which is connected
            with the capillary condensation in the interspaces between the
            particles of the quartz powder. Between the quartz particles in

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